IN THE CLAIMS

The following listing of the claims is provided in accordance with 37 C.F.R. §1.121.

1. (currently amended)   A system for assessing and optimizing crude selection comprising:

a database storing data comprising crude characteristic data related to at least one crude or crude blend[[;]] and crude processing data related to crude processing at a plurality of different operational conditions; and

a predictive engine having programmable instructions configured for execution by at least one processor for accessing the database to obtain data and for executing,

wherein the predictive engine is configured to assess similarity of the crude characteristic data and the crude processing data with input crude characteristic data and input crude processing data, respectively, to output statistical best matches with the data stored in the database,

wherein the predictive engine is configured to execute at least one predictive performance and/or risk assessment model designed to optimize or improve a refining process based on the statistical best matches.

2. (original) The system in accordance with Claim 1, wherein the predictive engine takes as input crude information corresponding to at least one crude slate and at least one refinery operating parameter and/or condition and uses desirability metrics to assess similarity of the input to data in the database.

3. (original) The system in accordance with Claim 2, wherein the at least one refinery operating parameter and/or condition corresponds to a specific refinery, and wherein the at least one predictive performance or risk assessment model executed by the predictive engine predicts performance or risk measures of refining the at least one crude slate using

the specific refinery for running the refining process, probability of problems occurring during the refining process, and distribution of the problems throughout the refining process.

4. (original) The system in accordance with Claim 1, wherein the predictive engine accesses treatment options stored within the database suitable for optimizing performance of the refining process.

5. (cancelled)

6. (original) The system in accordance with Claim 1, wherein the predictive engine comprises:

a crude search module which takes as input at least one crude name and/or at least one chemical or other characteristic of the at least one crude identifiable by the at least one crude name and outputs information with respect to at least one crude stored in the database, wherein the at least one crude output by the crude search module corresponds to at least one crude identifiable by the at least one crude name, or corresponds to at least one crude having at least one chemical or other property similar to at least one chemical or other property of the at least one crude identifiable by the at least one crude name;

an operating parameters/conditions search module which takes as input at least one refinery operating parameter and/or condition and outputs information stored in the database indicating at least one refinery having at least one identical or similar operating parameter and/or condition compared to the at least one refinery operating parameter and/or condition input; and

a crude slate and chemicals selection module which takes as input the information output by the crude search module and the information output by the operating parameters/conditions search module, and outputs at least one proposed crude slate, chemical treatment and/or performance or risk parameter.

7. (original) The system in accordance with Claim 6, wherein the crude slate and chemicals selection module includes a first tier, wherein the first tier identifies at least one crude slate stored in the database which is similar to at least one user-desired crude slate by scoring each crude slate component of the at least one user-desired crude slate based on how well the crude slate component satisfies user criteria, and combines all individual scores of the at least one user-desired crude slate to provide a composite crude slate score; wherein the first tier further scores each individual operating parameter and/or condition based on how well the individual operating parameter and/or condition satisfies the user criteria for that operating parameter and/or condition and outputs an operational score, and then combines all individual operational scores to provide a composite operational score; and wherein the first tier further determines a highest total overall score by combining the composite crude slate and composite operational scores.

8. (original) The system in accordance with Claim 7, wherein the crude slate and chemicals selection module further includes a second tier, wherein the second tier includes as an input at least information derived by the first tier and obtains predicted response parameters of interest for selected crude slates, operational parameters and/or conditions, and/or chemical treatments using the at least one predictive performance model.

9. (original) The system in accordance with Claim 1, wherein the predictive engine executes at least one optimization algorithm for the refining process.

10. (original) The system in accordance with Claim 9, wherein the at least one predictive performance model and/or the at least one risk assessment model is a type of model selected from the group consisting of linear regression models; logistic regression models; non-linear regression models; classification and regression trees and extensions thereof; multiple additive regression splines and extensions thereof; partial least squares regression models; generalized additive models; neural networks and extensions thereof,

such as projection pursuit regression; simulation models; expert system-based models, such as Bayesian Belief Networks; theoretical calculation models; engineering economic models; financial risk models; decision analytic models; and engineering process models based on chemistry, physics and engineering principles, such as reaction kinetics and thermodynamics, mass transfer, energy transfer, separation processes, and fluid dynamics.

11. (currently amended) A method for assessing and optimizing crude selection comprising the steps of:

accessing a database for obtaining data comprising crude characteristic data related to at least one stored crude or crude blend[[;]] and crude processing data related to crude processing at a plurality of different operational conditions;

assessing similarity of the crude characteristic data and the crude processing data with input crude characteristic data and input crude processing data, respectively, to output statistical best matches with the data stored in the database; and

executing at least one predictive performance and/or risk assessment model designed to optimize or improve a refining process for at least one crude or crude blend based on the statistical best matches.

12. (original) The method in accordance with Claim 11, further comprising the steps of:

taking as input crude information corresponding to the at least one crude or crude blend and at least one refinery operating parameter and/or condition; and

using desirability metrics to assess similarity of the input to data in the database, including the at least one stored crude or crude blend.

13. (original) The method in accordance with Claim 12, wherein the at least one refinery operating parameter and/or condition corresponds to a specific refinery, and wherein the at least one predictive performance or risk assessment model predicts performance or risk measures of refining the at least one crude or crude blend using the specific refinery for

running the refining process, probability of problems occurring during the refining process, and distribution of the problems throughout the refining process.

14. (original) The method in accordance with Claim 11, further comprising the step of accessing treatment options stored within the database suitable for improving or optimizing performance of the refining process.

15. (original) The method in accordance with Claim 11, further comprising the step of executing at least one optimization algorithm for the refining process.

16. (original) The method in accordance with Claim 15, wherein the at least one predictive performance model and/or the at least one risk assessment model is a type of model selected from the group consisting of linear regression models; logistic regression models; non-linear regression models; classification and regression trees and extensions thereof; multiple additive regression splines and extensions thereof; partial least squares regression models; generalized additive models; neural networks and extensions thereof, such as projection pursuit regression; simulation models; expert system-based models, such as Bayesian Belief Networks; theoretical calculation models; engineering economic models; financial risk models; decision analytic models; and engineering process models based on chemistry, physics and engineering principles, such as reaction kinetics and thermodynamics, mass transfer, energy transfer, separation processes, and fluid dynamics.

17. (currently amended) A computer readable medium storing a set of instructions configured for execution by at least one processor for performing the steps of:

accessing a database for obtaining data comprising crude characteristic data related to at least one stored crude or crude blend[[;]] and crude processing data related to crude processing at a plurality of different operational conditions;

assessing similarity of the crude characteristic data and the crude processing data with input crude characteristic data and input crude processing data, respectively, to output statistical best matches with the data stored in the database; and

executing at least one predictive performance and/or risk assessment model ~~designed~~ to optimize or improve a refining process for at least one crude or crude blend based on the statistical best matches.

18. (original) The computer readable medium in accordance with Claim 17, further performing the steps of:

taking as input crude information corresponding to the at least one crude or crude blend and at least one refinery operating parameter and/or condition; and

using desirability metrics to assess similarity of the input to data in the database, including the at least one stored crude or crude blend.

19. (original) The computer readable medium in accordance with Claim 18, wherein the at least one refinery operating parameter and/or condition corresponds to a specific refinery, and wherein the at least one predictive performance and/or risk assessment model predicts performance or risk measures of refining the at least one crude or crude blend using the specific refinery for running the refining process, probability of problems occurring during the refining process, and distribution of the problems throughout the refining process.

20. (original) The computer readable medium in accordance with Claim 17, further performing the step of accessing treatment options stored within the database suitable for optimizing performance of the refining process.

21. (original) The computer readable medium in accordance with Claim 17, further performing the step of executing at least one optimization algorithm for the refining process.

22. (original) The computer readable medium in accordance with Claim 21, wherein the at least one predictive performance model and/or the at least one risk assessment model is a type of model selected from the group consisting of linear regression models; logistic regression models; non-linear regression models; classification and regression trees and extensions thereof; multiple additive regression splines and extensions thereof; partial least squares regression models; generalized additive models; neural networks and extensions thereof, such as projection pursuit regression; simulation models; expert system-based models, such as Bayesian Belief Networks; theoretical calculation models; engineering economic models; financial risk models; decision analytic models; and engineering process models based on chemistry, physics and engineering principles, such as reaction kinetics and thermodynamics, mass transfer, energy transfer, separation processes, and fluid dynamics.

23. (new) A system, comprising:

a crude analyzer configured to compare a selected crude type and a selected refinery parameter with historical data comprising crude data related to a plurality of crude types and refinery data related to a plurality of refineries, wherein the crude analyzer is configured to identify one or more crude types and one or more refinery parameters in the historical data that are statistically similar to the selected crude type and the selected refinery parameter, respectively; and

a refinery optimizer configured to improve a refining process for the selected crude type and the selected refinery parameter based on the one or more crude types and the one or more refinery parameters identified by the crude analyzer.

24. (new) The system of claim 23, wherein the refinery optimizer is configured to evaluate a plurality of treatment options.

25. (new) A method, comprising:

comparing a selected crude type and a selected refinery parameter with historical data comprising crude data related to a plurality of crude types and refinery data related to a plurality of refineries, wherein comparing a selected crude type and a selected refinery parameter comprises identifying one or more crude types and one or more refinery parameters in the historical data that are statistically similar to the selected crude type and the selected refinery parameter, respectively; and

improving a refining process for the selected crude type and the selected refinery parameter based on the one or more crude types and the one or more refinery parameters identified in the comparing step.

26. (new) The method of claim 25, wherein improving comprises evaluating a plurality of treatment options.